Title	Viscosity of Copper Smelting Furnace Slags
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2) At 450°C, by chloridizing roasting of cinder containing more than 10 % of residual sulphur, about 95 % of copper and 90~98 % of cobalt are leached, and moreover leaching degree of iron in this cinder is decreased evidently than that of oxidizing roasting.

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16. Viscosity of Copper Smelting Furnace Slags

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Viscosity of slags is remarkably affected by temperature and chemical composition. We have studied the relation between chemical composition and viscosity of copper smelting furnace slags at 1300°, 1275°, 1250°, 1200°, 1175°, 1150°, 1125°, 1100° and 1075°C. The various components were obtained by adding metallic oxides, i.e. CaO, CaO+BaO, BaO, MgO and Al_2O_3, to a standard slag.

Viscosity of slags was measured by Sphere pull-up viscosimeter employed by K. Endell and his co-workers. (Fig. 1). After the sample was melted in crucible, 3, 6 and 9 % various oxide components were added to the slags, and it was kept at 1300°C for more than 30 mins. The changes in composition during the measurement runs were studied in a preliminary test, and it was shown that in 30 mins, melt slags attained almost constant composition, so the changes in composition can be ignored.

The analyses of several experimental samples are shown in the next table. From this table, the slags used in this experiment were mainly composed of 34–36 % Fe (44–47 % FeO), 6.3–12.6 % Al_2O_3, and 34–37 % SiO_2, and were considered to belong to Al_2O_3–FeO–SiO_2 system.

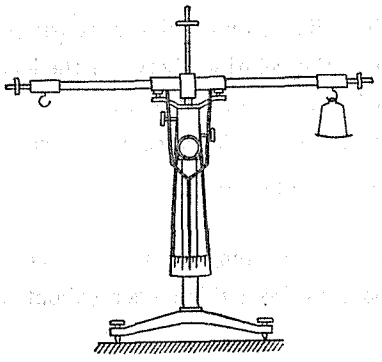

Fig. 1. Viscosimeter.

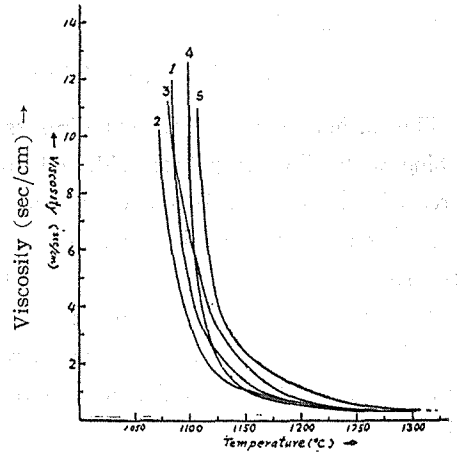

Fig. 2. Viscosity-temperature curves.

Chemical analyses of several experimental slags.

Sample No.	Added Comps.	Chemical Components								
		Cu	Fe	Zn	SiO_2	Al_2O_3	CaO	MgO	BaO	S
1	None (Std. slag)	0.41	36.1	2.7	37.0	8.6	0.07	0.12	Tr.	0.5
2	+3% CaO	0.7	34.8	2.5	36.8	8.8	1.9	0.05	〃	0.8
3	+6% BaO	0.9	35.3	2.7	34.2	9.6	0.16	0.03	4.7	0.7
4	+9% MgO	0.8	36.0	2.7	35.4	8.1	0.16	2.2	Tr.	0.7
5	+6% Al_2O_3	0.8	35.4	2.5	34.9	12.6	0.07	0.1	〃	0.7

In Fig. 2, some of the measured viscosities of slags are shown.

The results were as follows.

1. By addition of CaO to some extent, viscosity decreases in Al_2O_3-FeO-SiO_2 slags as in the CaO-Al_2O_3-SiO_2 and CaO-FeO-SiO_2 slags.

2. By addition of BaO, viscosity of slags somewhat increases in temperature range from 1200° to 1100°C.

3. It is said that an addition of MgO increases viscosity in the CaO-FeO-SiO_2 slags, and decreases in the CaO-Al_2O_3-SiO_2 slags. In the present experiment, viscosity seems to decrease a little at high temp., and somewhat increases at low temp. in the Al_2O_3-FeO-SiO_2 slags.

4. Viscosity of all sorts of slags seems to increases with increasing Al_2O_3 content.

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17. On the Utilization of Higher Boiling Products from the Reaction between Methyl Chloride and Si-Cu

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One of the authors (M.Kumada and M.Yamaguchi, *J. Chem. Soc., Japan* (*Industrial Section*), in press) previously reported that the distillation residue of methylchlorosilanes resulting from the reaction of methyl chloride with Si-Cu mainly consists of the three types of compounds: methyl-chloro-disiloxanes, -disilanes and -disilmethylenes.

The present research was performed in order to have more detailed information concerning the compounds included in the disiloxane fraction (fraction of b.p.ca. 100–150°C, mainly composed of disiloxanes).

At first, this fraction was caused to react with ethylmagnesium bromide, to substitute the contained Cl with ethyl radical, since it was difficult to separate the compounds containing Cl in that condition, and then this ethylated products were treated